CLAIMS

The invention claimed is

1. A heater head assembly for a Stirling cycle system, the heater head assembly comprising:

a body being of unitary construction, with a conically shaped body portion and a cylindrically shaped body portion being of one-piece construction and together defining an interior volume:

the conically shaped body portion having a planar surface constructed to pass heat when the heater head assembly is coupled to a heat source, a domed shaped interior surface, and a plurality of passageways being formed at least in part in the conically shaped portion; and

the cylindrically shaped body portion having first and second sections, the first section of the cylindrically shaped body portion having a cylindrical interior surface, and the second section of the cylindrically shaped body portion having rejector members extending radially inward into the interior volume with innermost portions thereof defining a cylindrical inward surface concentric with the cylindrical interior surface of the first section of the cylindrical shaped body portion;

regenerator material having a first surface positioned against the cylindrical interior surface of the first section of the cylindrically shaped body portion, the regenerator material extending radially inward into the interior volume and having an cylindrical inward second surface in inward positional alignment with the cylindrical inward surface of the rejector members; and

a cylindrical sleeve having an outer diameter sized to be adjacent to the cylindrical inward surface of the rejector members and to the cylindrical inward second surface of the regenerator material.

2. The heater head assembly of claim 1 further comprising a spider plate coupled to the cylindrical shaped body and having channels and ports providing fluid communication of the heater head assembly with a power conversion component of the Stirling cycle system.

3. The heater head assembly of claim 1 wherein the planar surface of the conically shaped body portion includes a plurality of channels, and the heater head assembly further includes an acceptor plate with a planar surface mating with the planar surface of the conically shaped body portion and having for a plurality of channels, the channels of the planar surfaces of the conically shaped body portion and the acceptor plate together forming the plurality of passageways.

4. The heater head assembly of claim 3 wherein the acceptor plate has an external planar surface constructed to pass heat when coupled to a heat source.

5. A heater head assembly for a Stirling cycle system, the heater head assembly comprising:

a body being of unitary construction with a first end body portion, a second end body portion and a third body portion between the first and second end body portions, the first, second and third body portions being of one-piece construction and together defining an interior volume:

the first end body portion having a planar surface constructed to pass heat when the heater head assembly is coupled to a heat source, and a plurality of passageways formed at least in part in the first end body portion;

the second end body portion having rejector members extending inward into the interior volume and defining inward end portions; and

the third body portion having an interior surface;

regenerator material having an outward surface positioned against the interior surface of the third body portion, the regenerator material extending inward into

the interior volume generally coextensive with the rejector members and having an inward surface;

a sleeve having an outer size to be adjacent to the inward end portions of the rejector members and to the inward surface of the regenerator material; and

a member coupled to the second end body portion and having channels and ports providing fluid communication of the heater head assembly with a power conversion component of the Stirling cycle system.

6. The heater head assembly of claim 5 wherein the first end body portion further includes a conical portion.

7. The heater head assembly of claim 5 wherein the planar surface of the first end body portion includes a plurality of channels, and the heater head assembly further includes an acceptor plate with a planar surface mating with the planar surface of the first end body portion and having for a plurality of channels, the channels of the planar surfaces of the first end body portion and the acceptor plate together forming the plurality of passageways.

8. The heater head assembly of claim 7 wherein the acceptor plate has an external planar mounting surface for mounting of the heat source thereto and constructed to pass heat when coupled to the heat source.

9. A heater head assembly for a Stirling cycle system, the heater head assembly comprising:

a body with a first end body portion, a second end body portion a third body portion between the first and second end body portions, the first, second and third body portions together defining an interior volume, wherein:

the first end body portion has a heat conducting planar external surface for positioning adjacent to a heat source to transfer heat to the first body end portion from the heat source when the heater head assembly is positioned

adjacent to the heat source, the first end body portion further has a plurality of fluid passageways formed therein and communicating with the interior volume;

the second end body portion has rejector members extending inward into the interior volume and defining inward end portions; and

the third body portion has an interior surface;

regenerator material positioned in the interior volume and having an outward surface positioned against the interior surface of the third body portion, the regenerator material extending inward into the interior volume generally coextensive with the rejector members and having an inward surface;

a sleeve positioned in the interior volume and having a sleeve wall adjacent to the inward end portions of the rejector members and to the inward surface of the regenerator material; and

a member coupled to the second end body portion and having channels and ports providing fluid communication of the heater head assembly with a power conversion component of the Stirling cycle system.

10. A Stirling cycle system comprising:

a body having an acceptor portion with a plurality of passageways formed at least in part therein, an outer wall of a regenerator portion, and an outer wall of a rejector portion, with the acceptor portion being fluidly coupled to the regenerator portion and the regenerator portion being fluidly coupled to the rejector portion, the acceptor portion, the outer wall of the regenerator portion and the outer wall of the rejector portion being of one-piece construction;

a power piston fluidly coupled to the rejector portion;

a mover fixedly coupled to the power piston; and

a stator electromagnetically coupled to the mover.

11. The Stirling cycle system of claim 10 wherein the acceptor portion of the body has a planar surface with a plurality of channels, and the system further includes an acceptor plate with a planar surface mating with the planar surface of the

acceptor portion of the body and having a plurality of channels with the channels of the planar surfaces of the acceptor portion of the body and the acceptor plate together forming a plurality of fluid passageways.

12. The Stirling cycle system of claim 10 wherein the acceptor portion of the body has a plurality of channels, and the system further includes an acceptor member mating with the acceptor portion of the body and having a plurality of channels with the channels of the acceptor portion of the body and the acceptor member together forming a plurality of fluid passageways, the acceptor member having a heat conducting planar external surface for positioning adjacent to a heat source to transfer heat to the acceptor portion of the body from the heat source when the acceptor member is positioned adjacent to the heat source.

13. The Stirling cycle system of claim 10 wherein the body further includes rejector members being of one-piece construction with the acceptor portion, the outer wall of the regenerator portion and the outer wall of the rejector portion, and projecting from the outer wall of the rejector portion of the body.

14. A body for a Stirling cycle system, the body having an acceptor portion with a plurality of passageways formed at least in part therein, an outer wall of a regenerator portion, and an outer wall of a rejector portion, with the acceptor portion being fluidly coupled to the regenerator portion and the regenerator portion being fluidly coupled to the rejector portion, the acceptor portion, the outer wall of the regenerator portion and the outer wall of the rejector portion being of one-piece construction.

15. The body for a Stirling cycle system of claim 14 wherein the body further includes rejector members being of one-piece construction with the acceptor portion, the outer wall of the regenerator portion and the outer wall of the rejector portion, and projecting from the outer wall of the rejector portion of the body.

16. A Stirling cycle system comprising:

an acceptor with a heat conducting planar external surface constructed for positioning adjacent to a heat source to pass heat from the heat source when positioned adjacent to the heat source;

a regenerator fluidly coupled to the acceptor;

a rejector fluidly coupled to the regenerator;

a power piston fluidly coupled to the rejector;

a mover fixedly coupled to the power piston; and

a stator electromagnetically coupled to the mover.

17. The Stirling cycle system of claim 16 further including a body defining a portion of the acceptor with a plurality of passageways formed at least in part therein, an outer wall of the regenerator, and an outer wall of the rejector, the acceptor portion, the outer wall of the regenerator portion and the outer wall of the rejector portion being of one-piece construction.

18. The Stirling cycle system of claim 17 wherein the acceptor portion of the body has a planar surface with a plurality of channels, and the system further includes an acceptor plate with a planar surface mating with the planar surface of the acceptor portion of the body and having a plurality of channels with the channels of the planar surfaces of the acceptor portion of the body and the acceptor plate together forming a plurality of fluid passageways.

19. The Stirling cycle system of claim 17 wherein the acceptor portion of the body has a plurality of channels, and the system further includes an acceptor member mating with the acceptor portion of the body and having a plurality of channels with the channels of the acceptor portion of the body and the acceptor member together forming a plurality of fluid passageways, the acceptor member having a heat conducting planar external surface for positioning adjacent to the heat source to transfer heat to the

acceptor portion of the body from the heat source when the acceptor member is positioned adjacent to the heat source.

20. The Stirling cycle system of claim 17 wherein the body further includes rejector members being of one-piece construction with the acceptor portion, the outer wall of the regenerator portion and the outer wall of the rejector portion, and projecting from the outer wall of the rejector.

21. The Stirling cycle system of claim 17 constructed as an electrical generator wherein the stator is configured to output electrical power.

22. The Stirling cycle system of claim 17 constructed as a cooler wherein the stator is configured to receive electrical power.

23. A heater head assembly for a Stirling cycle system, the heater head assembly comprising:

regenerator material; and

a body having an acceptor portion, an outer wall of a regenerator portion, and an outer wall of a rejector portion, with the regenerator portion being sized to receive the regenerator material, the body having an internal volume shaped to receive a displacer, the acceptor portion, the outer wall of the regenerator portion and the outer wall of the rejector portion being of one-piece construction.

24. The heater head assembly of claim 23 wherein the body further includes rejector members being of one-piece construction with the acceptor portion, the outer wall of the regenerator portion and the outer wall of the rejector portion, and projecting from the outer wall of the rejector portion of the body.

25. The heater head assembly of claim 23 further comprising a member fluidly coupled to the rejector portion of the body, the member having ports

configured for fluid coupling with a power conversion component of the Stirling cycle system.

26. The heater head assembly of claim 23 wherein the acceptor portion of the body has a conically shaped portion and a planar surface with a plurality of channels, and heater head assembly further includes an acceptor plate with a planar surface mating with the planar surface of the acceptor portion of the body and having a plurality of channels with the channels of the planar surfaces of the acceptor portion of the body and the acceptor plate together forming a plurality of fluid passageways.

27. The heater head assembly of claim 26 wherein the plurality of fluid passageways opening into the internal volume and fluidly communicate with the regenerator material in the regenerator portion.

28. The heater head assembly of claim 23 further including an acceptor member attached to the acceptor portion of the body and having a heat conducting planar external surface for positioning adjacent to a heat source to transfer heat to the acceptor portion of the body from the heat source when the acceptor member is positioned adjacent to the heat source.

29. The heater head assembly of claim 28 wherein the acceptor portion of the body has a planar surface and the acceptor member is a plate with a planar surface mating with the planar surface of the acceptor portion of the body, the plate being constructed to pass heat to the planar surface of the acceptor portion of the body when the plate is positioned adjacent to the heat source.